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Re: The Reassessment of FCC Radio Frequency Exposure Limits and Policies

This is a summary of a meeting between myself, Peter Sullivan, and Ed Mantiply and Bruce Romano, which took place on April 23, 2015. My objective for this meeting was to update the FCC on the emerging evidence that exposure to wireless and EMF is playing a role in the autism epidemic.

This ex parte brief also serves as a follow-up to a letter I sent to the FCC in 2013 in response to its review of radio frequency safety guidelines, specifically their safety guidelines for children:

<http://apps.fcc.gov/ecfs/comment/view?id=6017455777>

To summarize that letter, my approach has been to systematically evaluate all environmental factors that may be driving the autism epidemic. The medical community initially assumed that autism was 100% genetic, and, until recently, that has been the primary focus of research funding. However, a study of autistic twins published in 2011 showed that at most, genetics could only account for about 37% of the cause (1). Therefore, the majority of the cause must be due to environmental factors. Furthermore, even among the 37% of cases attributable to genetics, the majority of these are due to “de novo” mutations, which are mutations that are not inherited. Again, this points us back to the environment for factors that could be raising the rate of mutations, primarily in sperm (2).

My primary focus over the last 10 years has been funding environmental health organizations around toxins, specifically the development of methods that enable widespread testing and biomonitoring of humans. The problem in this area is the vast number (approximately 85,000) of man-made toxic chemicals in the environment. We don’t even have tests to detect most of these chemicals. University of California at San Francisco has come up with an interesting approach to tackle this situation using time of flight mass spectroscopy. They can separate the molecules by weight to determine which molecules are present and absent to narrow down the field. I am funding their pilot study of autistic and non-autistic children to look at these chemical differences. There are several possible outcomes, but we believe the most likely is that the autistic population will have a higher total load of man-made chemicals.

In May 2015, biochemistry Professor Martin Pall (Washington State University) presented this talk at the Autism One conference:

The Autism Epidemic Is Caused by EMFs, Acting via Calcium Channels and Chemicals Acting via NMDA-Rs: Downstream Effects Cause Autism

<http://www.autismone.org/content/autism-epidemic-caused-emfs-acting-calcium-channels-and-chemicals-acting-nmda-rs-downstream->

The discovery that calcium channels are voltage regulated is recent (2003), and the scientist who made the discovery, Roderick MacKinnon, won the Nobel Prize in Chemistry for it. There is evidence that EMF opens calcium channels, allowing calcium ions to rush into the cell, dysregulating nitric oxide (NO), which increases inflammation.

Pall also believes that chemical toxins as a whole activate the NMDA (N-methyl-D-aspartate) receptors. NMDA receptors are also related to reward and addiction. This increases the excitatory response and again leads to increased inflammation. Both of these factors work together to create a state of inflammatory overload.

I shared all of this information with Ed Mantiply and Bruce Romano at the aforementioned meeting on April 23, 2015. Here is a paraphrasing of Mr. Mantiply's response:

"I read Dr. Pall's references on the voltage regulated calcium channels. Those effects seem to be based on lower frequency field effects, not RF/photons. I would suspect an electric field with a volts/meter impact. I also think the biophysics research is more grounded in specific measurements we can use to set safety limits. Other researchers are also mentioning cytokines in relation to inflammation and not nitric oxide."

Going back to de novo mutations (non-inherited mutations), the most likely suspect is the increasingly prevalent practice of men carrying cell phones in their front pockets. The majority of studies show that RF can damage sperm, including DNA damage (3). This topic of sperm damage via RF is also mentioned by Dr. Martha Herbert (Harvard) and is referred to as "genotoxicity." (4) This will likely be quite simple and quick to prove or disprove. Additionally, the liability for damage to human germline is hard to calculate, since it could affect an almost unfathomable number of future descendants.

California physician Toril Jelter came up with a protocol to reduce EMF exposure for children with autism (and ADHD) called "The Calming Protocol":

<http://www.electronicssilentspring.com/calming-behavior/>

This protocol essentially consists of parents turning off baby monitors, DECT cordless phone base stations, Wi-Fi, and the electrical circuit to the bedroom at night. More than 80% of children placed on this protocol have improved, including one non-verbal autistic child who spoke for the first time after 3 days on the protocol. Another physician and I have also been using this protocol and the results can be duplicated with a high rate of

consistency. Thus far, several dozen children have been through the protocol, so at this point we intend to share it with a larger audience.

The key insight here is that autism is not a permanent condition, but rather a collection of symptoms resulting from a state of overload. This is the theory that Dr. Martha Herbert has been asserting for the last several years.

In my meeting with Mr. Mantiply and Mr. Romano, we also discussed the impact of turning off the bedroom electrical circuit at night. As I said before, Mr. Mantiply believes that electrical fields and dirty electrical noise are more likely the causative factor, and not RF. He also mentioned that the FCC has received a large number of letters from the public regarding health concerns about smart meters. Again, he believes that the smart meter health effects are most likely caused by noise from the switching power supply (which generates dirty electricity) than directly from RF.

The smart meter issue has brought EMF safety concerns to the forefront of public awareness very quickly. A large number of people who didn't even know where their power meter was or what EMF was are now becoming concerned.

During our meeting, Mr. Romano and I disagreed about whether or not the health effects were a real issue, and he mentioned the nocebo effect. He said that he didn't believe that EMF/RF is harmful, while I maintained that it is. He expressed that due to the nocebo effect, he thinks EMF/RF causes harm because people think it causes harm. I think it is more likely that there is real harm, since the same physiological effects are being reported in multiple cultures and countries, even where there is a significant social disincentive to bringing up the issue.

[Personal note - the nocebo effect only applies to people who believe something is harmful. In my case, and in many others, we believed it was completely safe until physical pain or other health symptoms arose that could be clearly linked to wireless exposures.]

I told Mr. Mantiply and Mr. Romano that variations in calcium channel function are not just related to autism; it is now understood to be a factor in ADHD, depression, bipolar disorder, and schizophrenia (5). For this reason, I'm concerned that a suicide cluster at a high school in Palo Alto (Gunn High School) near my house could be related to an extremely high powered cell tower right behind their math building. Here is a link to a letter I wrote to the principal and other school officials:

<http://bit.ly/safepaloalto>

At one point in our meeting, Mr. Romano asked, "Who else have you talked to here in Washington?"

I told him that I had talked to the DOE briefly last fall about the electrical noise/dirty electricity concern, and that I had also contacted the White House, a staffer of which sent

me to the Department of Health and Human Services. I let him know that I had also contacted the FDA.

At this point, Mr. Mantiply made several suggestions for contacts both inside and outside the government:

Dr Michael Wyde at NIEHS

<http://www.niehs.nih.gov/health/topics/agents/cellphones/>

Joe Bowman at NIOSH

<http://www.cdc.gov/niosh/programs/manuf/noragoals/projects/927ZBCK.html>

Frank Barnes at University of Colorado at Boulder

<http://beboulderanywhere.colorado.edu/itp/about-us/faculty-bios/frank-barnes>

The meeting ending after approximately 30 minutes of discussion.

Post-Meeting Updates

This study, published in 2016 supports the theory that total toxic load (and not one specific toxin) as was discussed in the meeting:

Boggess, Andrew, et al. "Mean serum-level of common organic pollutants is predictive of behavioral severity in children with autism spectrum disorders." *Scientific reports* 6 (2016).

<https://bmccomplementalternmed.biomedcentral.com/articles/10.1186/s12906-015-0564-0>

Martin Pall's latest talk (2017)

EMFs and Chemicals as the Two Main Drivers of the Autism Epidemic: Mechanisms of Action

<http://www.autismone.org/content/emfs-and-chemicals-two-main-drivers-autism-epidemic-mechanisms-action>

https://www.youtube.com/watch?v=fJsWkzi14vM&index=12&list=PLtw9iWxwfPldYlu_nR7lctt9-unraLFtRa

Comet assay data from the NIH NTP study adds to the weight of the existing evidence that DNA damage from cellphones may play a role in de novo mutations associated with a sizable percentage of autism cases:

Report of Partial Findings from the National Toxicology Program Carcinogenesis Studies of Cell Phone Radiofrequency Radiation in Hsd: Sprague Dawley® SD rats (Whole Body Exposure)

<http://www.biorxiv.org/content/early/2016/06/23/055699>

It is interesting to note that this study on the effects of cellphones on semen quality, funded by the Electric Power Research Institute, was published after our meeting:

Lewis, Ryan C., et al. "Self-reported mobile phone use and semen parameters among men from a fertility clinic." *Reproductive Toxicology* 67 (2017): 42-47.

<http://www.sciencedirect.com/science/article/pii/S0890623816304087>

References

1. Hallmayer, Joachim, et al. "Genetic heritability and shared environmental factors among twin pairs with autism." *Archives of general psychiatry* 68.11 (2011): 1095-1102.

2. Iossifov, Ivan, et al. "The contribution of de novo coding mutations to autism spectrum disorder." *Nature* 515.7526 (2014): 216-221.

<http://www.ucsf.edu/news/2014/10/120146/dozens-genes-associated-autism-new-research>

3. Research on the Effects of Cell Phone Radiation on Human Sperm

http://www.ci.berkeley.ca.us/uploadedFiles/Planning_and_Development/Level_3_-_Commissions/Commission_for_Community_Environmental_Advisory/CEAC2011-04-07_1i-Effects_of_CellPhoneRadiation_onHumanSperm-Moskowitz.pdf

4. Herbert, Martha R., and Cindy Sage. "Autism and EMF? Plausibility of a pathophysiological link—Part I." *Pathophysiology* 20.3 (2013): 191-209.

5. Cross-Disorder Group of the Psychiatric Genomics Consortium. "Identification of risk loci with shared effects on five major psychiatric disorders: a genome-wide analysis." *The Lancet* 381.9875 (2013): 1371-1379.